

# **MI Travel Counts**

## **Pretest Data Report**

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## 1.0 EXECUTIVE SUMMARY

Parsons Brinckerhoff (PB) received the household file on February 20, 2004 with 126 records. On February 23, 2004, PB received the person file with 283 records. The trip and long distance files were received on February 24, 2003 with 1,987 and 228 records, respectively. On March 26, 2004, PB received new household, person, and trip datasets with updated geocoded information. There were no problems found with the household file or the person file. With the newest datasets, there was one (1) record in the trip file that had a problem with the time of arrival and/or the time of departure. It was found that this trip concluded on the third day of the survey and could not be entered into the system as such. MORPACE and PB recommend that the day/time conventions be changed to reflect the following: Day 1 from 3 am to 12 am; Day 2 from 12 am to 12 am; and Day 3 from 12 am to 3 am.

Of the 1,987 trip records submitted, 25 of those records/persons recorded no trips from 18 different households. Eight households reported no trips, approximately 6.3 percent. There was one household/person where a trip was not made and the reason was ambiguous. It is recommended that this one household be re-contacted or the interviewer questioned regarding this household.

PB will be reviewing the sample set to ensure that targets are being reached for each of the regions, household size, and auto ownership. Given the small sample set that was taken for the pretest, no recommendations are being made at this time. The cell targets and drop-off rates will continue to be monitored and recommendations made in future reports, if need be.

PB reviewed 103 records that did not have geocoding. Upon review, it was found that 28 records could possibly be geocoded given the respondent information and should be further reviewed by MORPACE. There were 55 records from 11 households were found to be ungeocodable. It was found that 20 records were to other states outside of Michigan and should be geocoded to the city center, if possible.

Based on the geocoding, it was found that 12 trip ends had possible incorrect City/Township assignment. Also based on the geocoding, it was found that 266 trip ends had possible incorrect TAZ assignment.

PB reviewed time/distance for dataset quality. There were 1,987 records in the trip file, 190 records were disregarded/removed due to non-geocoding, non-trip making, same-point geocoding, or a non-vehicular trips (bicycle/moped, walk, train, or other). Of the original 1,987 trips, 190 were removed, leaving 1,797 trips, which is approximately 90%. Two of the trips were made outside Michigan, in the state of Ohio (QNO 36, Person 1, Trip 5 & 6).

The following number of records were flagged for the following reasons:

- Same City/Township with trip over 60/90 minutes: 20 records
- Travel time difference over 60 minutes: 36 records (19 records from same city/township)
- Average Travel Speed above or below threshold: 248 records (some duplicate records from above)

Through further review, it was found that there were 52 trips that are questionable represented by 30 households. MORPACE will need to review some these records for geocoding and make a recommendation for inclusion in the dataset. Some of these records are school trips during peak drop-off/pick-up times and should also be considered for inclusion.

## 2.0 REVIEW OF LOGIC CHECKS

Parsons Brinckerhoff (PB) received the household file on February 20, 2004 with 126 records. On February 23, 2004, PB received the person file with 283 records. The trip and long distance files were received on February 24, 2003 with 1,987 and 228 records, respectively.

### 2.1 Listing of Problems Found by Dataset

Below is a summary of each type of dataset and a summary and any problems found in the dataset.

#### 2.1.1 Household

PB received 126 records for the household file. Three checks were performed on the data file:

1. Number of workers in the household were less than number of persons in household
2. Number of subsidized vehicles in the household were less than the number of total vehicles in the household
3. Day of the week correctly corresponded to the day

All fields were filled in except for the zone column and ***there were no problems found in the dataset.***

#### 2.1.2 Person

PB received 283 records for the person file. All person records corresponded to a record in the home file. Fifteen checks were performed on person file:

1. Person number in home file is less than or equal to number of persons in household
2. Check for proxy for persons under 16 years of age
3. Check person number proxy is less than or equal to number of persons in household
4. Check persons under 16 years of age are licensed drivers
5. Check if person has transit pass, that corresponding transit type is listed
6. Check respondents 18 years of age or older are not code 0 for education level, check that respondents 16 years of age or younger are code 0 for education level
7. If currently a student, check for school name through school zone
8. Check that respondents under 16 years of age are code 5 in working status
9. Check that respondents that are not working are asking the not working status question
10. Check that worker questions are only asked if working status is code 1 or code 2
11. Check that only respondents who indicated "other" industry have an answer for other industry
12. Check that only respondents who have a fixed workplace have answers for work address through work zone.
13. Check that secondary job questions are only asked if respondent has more than one job.
14. Check that respondents who completed the diary are not code 3 for using the completed diary, other respondents should be code 3 for using completed diary
15. Check that no information is missing for the following: Gender, Age, Age Range, Relationship, Licensed Driver, Transit Pass, Education Level, School Type, Working Status, Proxy, Diary Completed, Long Distance Trip

***There were no problems found with the dataset.***

### 2.1.3 Trip

PB received 1,987 records within the trip pretest file. All trip files related to the home file and person file. The following checks were performed on these records:

1. Check that person number is less than or equal to number of persons in household
2. Check that number of household persons in vehicle are not greater than number of persons in household
3. Check that only respondents who indicated "other" for type of origin, destination, type of transportation, bus provider have an answer in the other category
4. Check that bus provider is not missed if trip involved dial-a-ride or public bus
5. Check for pay for trip if transportation mode is 6,7,8, or 9
6. Check for amount paid if paid for trip
7. If Type of Transportation used is 1,2,3, then check to make sure if driver or passenger and number of people in vehicle and that number of household members is not greater than number of persons in household
8. Check that respondent is not listed as a household member in the vehicle
9. If type of transportation used is 1,2,3, then check for household vehicle used in trip and pay for parking
10. Check to see if paid for parking that amount paid, parking rate are valid
11. If parking rate is other, check for other parking rate
12. Check that all cases (except those respondents that did not travel) are not missing arrival time or destination time
13. Check that arrival time is after departure time
14. Check if household vehicle was used in the trip, that there are number of vehicles in household greater than zero
15. Check for absent cross-streets

***There was 1 record found with an error in time of departure and/or time of arrival, this is:***

**TABLE 2-1: ERROR IN DEPARTURE/ARRIVAL TIME**

RECTYP	QNO	PERNUM	TRIPNUM	DTIME	DDAY	ATIME	ADAY
3	175	1	4	2340	2	259	2

MORPACE has indicated that the arrival time of this trip occurred on the third day of the survey and the CATI system would not allow a third day as an entry. MORPACE has suggested the following day/time conventions, such that travel time calculation would not be confusing or negative:

- Day 1 – 3 am to 12 am
- Day 2 – 12 am to 12 am
- Day 3 – 12 am to 3 am

PB concurs with this convention and it is consistent with other travel surveys taken throughout the United States.

### 2.1.4 Long Distance

PB received 228 records for the long distance pretest file. All records matched up with the home file and person file. The following checks were made on the data:

1. Check for respondents that indicated "other" for Transportation to Reach Location, Type of Transportation Used has a value in the corresponding other field
2. If public bus was used for Transportation to Reach Location, or Type of Transportation Used, check bus provider for corresponding bus field

3. Check that the number of times the trip was taken in the last three months is less than the number of times the trip has been taken in the last 12 months

***There were no errors found in this file.***

#### ***2.1.5 Visitor***

There was not a visitor file submitted for the pretest.

### ***2.2 Recommendations***

MORPACE has suggested that the day/time conventions be changed in the CATI system such that travel time calculation would not be confusing or negative, this change would be:

Day 1 – 3 am to 12 am

Day 2 – 12 am to 12 am

Day 3 – 12 am to 3 am

PB concurs with this convention.

## **3.0 REVIEW OF ZERO TRIP HOUSEHOLDS**

PB received 1,987 pretest data records from MORPACE for the trip file. This section of the report reviews those records that recorded zero trips.

### ***3.1 Summary of Zero Trip Households / Persons***

Of the 1,987 records submitted, 25 of those records/persons recorded no trips from 18 different households. Eight households reported no trips. Five of those households were one person households, two households were two person households, and the other household was a three person household. Out of the 126 households interviewed for the pretest, eight of those had no trips, which is approximately 6.3 percent. The table below summarizes the variety of reasons why no trips were made:

**TABLE 3-1: ZERO TRIP HOUSEHOLDS / PERSONS**

QNO	Person Number	Number of People in HH	Reason
1	2	4	HE'S A STAY AT HOME DAD, HE'S NOT WORKING AND DOES NOT GO TO SCHOOL.
31	1	1	I HAD NO WHERE TO GO MY KIDS DO MY SHOPPING AND IT WAS TOO COLD TO GO OUT
45	1	2	THEY ARE BOTH ELDERLY AND ONLY GO OUT WHEN NECESSARY WHICH AMOUNTS TO ABOUT TWO TO THREE TIMES PER MONTH.
45	2	2	THEY ARE BOTH ELDERLY AND ONLY TRAVEL OUTSIDE OF THE HOME WHEN NECESSARY WHICH AMOUNTS TO ABOUT 2 - 3 TIMES PER MONTH
50	2	2	I'M A HOMEMAKER
110	2	4	SICK/ILL
127	1	2	I STAYED HOME DOING HOUSEHOLD CHORES
189	1	1	GO TO SECOND JOB
247	1	2	HAD NO PLACE TO GO I AM 81 YEARS OLD
247	2	2	OLDEN IS 82 YEARS OLD AND GOES OUT MOSTLY SATS. TO CHURCH
274	1	2	DID NOT DRIVING
292	1	7	2 DAYS OFF WORK AND THERE WAS A LOT OF SNOW -- STAYED HOME
381	1	1	HAD A LOT OF SNOW
384	1	2	BECAUSE WE HAD A LOT OF SNOW
427	2	4	LACK OF CAR
427	3	4	LACK OF A CAR FOR MOTHER
427	4	4	LACK OF CAR FOR MOTHER
496	1	3	I JUST HAD NO WHERE TO GO
496	3	3	CAUSE I (WILLIAM) WATCHED HIM.
522	1	1	ROADS WERE BAD DID NOT WANT TO DRIVE
535	1	1	SICK/ILL
545	1	3	SICK/ILL
545	2	3	WORK
545	3	3	MOTHER WAS HOME SICK SO HE WAS HOME WITH HER
595	3	3	CONFINED TO A WHEELCHAIR DID NOT GO ANYWHERE

### 3.2 Recommendations

Record number 189, person number 1 should be further investigated to determine why a trip was not made. The reason of "Go to second job" is not consistent with staying home for a two-day period. It is recommended that MORPACE either call back the respondent or ask the interviewer if they recall this particular person.

## 4.0 REVIEW OF SAMPLING DATA

This section of the report will review some statistics about the data, including the regional numbers and other cross-classification information concerning the data. Given that this is the pretest data and the amount that was collected was small during the short timeframe, it is difficult to compare the data to the target percentages.

### 4.1 Summary

The following tables summarize the pretest data by region, household size, auto ownership, number of workers, and some other variables. These tables are compiled to ensure that household size, auto ownership, number of workers, and other variables are varying by region.

**TABLE 4-1: HOUSEHOLD SIZE BY REGION**

Region	Household Size				Total
	1 Person	2 Persons	3 Persons	4+ Persons	
1A. SEMCOG outside Detroit	4	11	3	0	18
1B. Detroit	0	4	2	0	6
2. Small Cities	6	5	3	1	15
3. Upper Peninsula Rural	5	12	1	1	19
4. Northern Lower Peninsula	4	5	2	3	14
5. Southern Lower Peninsula	1	7	3	9	20
6. TMAs	8	9	0	2	19
7. Small Urban-Modeled Area	3	7	3	2	15
Total	31	60	17	18	126

**TABLE 4-2: NUMBER OF HOUSEHOLDS BY AUTO OWNERSHIP BY REGION**

Region	Number of Automobiles						Total
	0	1	2	3	4	5	
1A. SEMCOG outside Detroit		6	7	5			18
1B. Detroit			5		1		6
2. Small Cities	2	6	6	1			15
3. Upper Peninsula Rural	1	5	7	5	1		19
4. Northern Lower Peninsula		3	6	2	2	1	14
5. Southern Lower Peninsula		6	5	4	4		20
6. TMAs	1	7	8	2	1		19
7. Small Urban-Modeled Area		5	8	2			15
Total	4	38	52	21	9	2	126

**TABLE 4-3: NUMBER OF HOUSEHOLDS BY NUMBER OF WORKERS BY REGION**

Region	Number of Workers				Total
	0	1	2	3+	
1A. SEMCOG outside Detroit	4	5	8	1	18
1B. Detroit	1	0	5	0	6
2. Small Cities	8	3	4	0	15
3. Upper Peninsula Rural	7	8	4	0	19
4. Northern Lower Peninsula	2	6	5	1	14
5. Southern Lower Peninsula	4	2	11	3	20
6. TMAs	8	5	6	0	19
7. Small Urban-Modeled Area	7	5	3	0	15
Total	41	34	46	5	126

**TABLE 4-4: TYPE OF WORKER BY AGE**

Age Range	Type of Worker				Total
	Full-Time	Part-Time	Not Working	Other	
Under 18	0	0	4	44	48
18-44	48	13	10	3	74
45-54	29	10	5	0	44
55-64	22	7	20	3	52
65 and older	6	5	49	3	63
Other	2	0	0	0	2
Total	107	35	88	53	283

**TABLE 4-5: TYPE OF WORKER BY REGION**

Region	Number of Workers				Total
	Full Time	Part-Time	Not Working	Other	
1A. SEMCOG outside Detroit	7	3	2	2	14
1B. Detroit	18	6	9	2	35
2. Small Cities	9	2	12	6	29
3. Upper Peninsula Rural	14	2	15	5	36
4. Northern Lower Peninsula	13	6	8	6	33
5. Southern Lower Peninsula	26	8	15	19	68
6. TMAs	13	4	12	5	34
7. Small Urban-Modeled Area	7	4	15	8	34
Total	107	35	88	53	283

**TABLE 4-5: HOUSEHOLD SIZE VERSUS WORKER STATUS**

Household Size	Number of Workers				Total
	Full Time	Part-Time	Not Working	Other	
1 Person	8	4	16	0	31
2 Persons	50	18	49	0	120
3 Persons	23	4	13	11	51
4+ Persons	26	9	10	33	81
Total	107	35	88	44	283

**TABLE 4-6: AVERAGE NUMBER OF TRIPS PER DAY BY REGION**

Region	Day 1	Day 2	Average
1A. SEMCOG outside Detroit	2.8	2.9	2.9
1B. Detroit	3.2	2.7	2.9
2. Small Cities	4.9	3.8	4.3
3. Upper Peninsula Rural	2.4	2.7	2.6
4. Northern Lower Peninsula	4.4	3.6	4.0
5. Southern Lower Peninsula	3.5	2.8	3.7
6. TMAs	3.3	2.9	3.1
7. Small Urban-Modeled Area	4.2	3.5	3.9
Total	3.6	3.3	3.5

**TABLE 4-7: WORK TRIPS**

Type of Worker	Did make a work trip	Did not make a work trip	Total
Full – Time	98	9	107
Part –Time	23	12	35
Unpaid Volunteer or Worker	0	9	9
Not Working	2	86	88
Other	0	44	44
Total	123	160	283

There were 2 records which showed a worker status of not working in the person file and had work trips associated with the trip file. The first record was for QNO 421, Person 1, this person made 6 trips in two days that either had the primary activity at the origin or destination as work. The second record was for QNO 525, Person 1, this person made 2 trips in one day that either had the primary activity at the origin or destination as working.

## 4.2 Recommendations

Given the small sample set that was taken for the pretest, no recommendations are being made at this time. The cell targets and drop-off rates will continue to be monitored and recommendations made in future reports, if need be. It is recommended that the CATI system be updated so that if a person states that they are not working, then they can not make a work trip as the activity for the origin or destination.

## **5.0 REVIEW OF GEOCODING RESULTS**

On March 26, 2004, PB received the pretest (pilot) data which was geocoded to the Michigan Geographic Framework version 3.0 file. This section of the report reviews the geocoding and the time/distance checks.

### **5.1 Summary of Geocoding Checks**

Two different types of reviews were conducted based on the geocoding. The first review is of the geocoding points itself, comparing the address to the points. The second review uses the geocoding to determine if the length of trip recorded by the respondent is reasonable given the geocoding information and roadway mapping information.

#### **5.1.1 Review of Geocoding**

There are several geocoding checks that have been done to check placement and data quality. These checks include:

- Review of Zip Code based on Assigned Geocoding
- Review of City/Township name based on Assigned Geocoding
- Review of TAZ based on Assigned Geocoding

The role of these checks is to raise flags in the data compared to the geocoding. MORPACE will have to review the records to determine if the geocoding is incorrect or the data is incorrect.

#### **Review of Non-Geocodables**

PB reviewed 103 records that did not have geocoding. Upon review, it was found that 28 records could possibly be geocoded given the respondent information and should be further reviewed by MORPACE. There were 55 records from 11 households were found to be ungeocodable. It was found that 20 records were to other states outside of Michigan and should be geocoded to the city center, if possible. Table 5-1 summarizes those records.

#### **Review of City/Township Name**

There were 3948 trips ends that were checked for City/Township name against the geocoded locations. There were 12 trips ends that were found to have incorrect city/township names based on geocoded locations. Table 5-2 summarizes the 12 trip ends.

#### **Review of TAZ Assignment**

There were 3948 trips ends that were checked for TAZ assignment within TransCAD. Of the 3948 trips ends, 266 trip ends contained errors in TAZ assignment or were on a boundary. Table 5-3 summarizes those records.

TABLE 5-1: REVIEW OF NON-GEOCODABLES

QNO	Person #	Trip #	Location	Changes / Comments
13	2	3-4	KROGERS	Non-geocodable
36	1	4-5	PERRYBURGS	Assign to External City
36	1	5-6	VAN WERT	
36	1	6-7	CIRCLE VILLE	
36	1	7-8	B P	
36	1	8-9	WENDYS	
36	1	9	CARRIES	
43	2	12-13	RESIDENCE	Non-geocodable
60	1	1-2	BOBS STORE	name is "Bob's Family Store" on E. 4619 M-35, Escanaba MI 49826
84	1	3-4	MILL CREEK VILLAGE	Non-geocodable
98	2	4-5,10-11	WHITE CONSOLIDATED	Electrolux in Greenville, Michigan
204	1	1-2,7-8	NEIGHBORS HOME	Non-geocodable
204	3	1-2,5-6	NEIGHBORS HOME	Non-geocodable
204	3	2-3, 6-7	BUS STOP	Assign to S Baldwin Road and Seymour Lake Road intersection on the border of Brandon and Oxford Townships, coordinates around -83.334004, 42.817012
257	2	1-6	LOUISIANA PACIFIC	Non-geocodable
257	2	2-3	RESTAURANT	Non-geocodable
260	1	4-5	MOTHER IN LAWS	Non-geocodable
260	1	5-6	DAUGHTERS WORK PLACE	
260	2	4-5	MOTHER IN LAWS	
260	2	5-6	DAUGHTERS WORKPLACE	
285	2	7-8	MSU CREDIT UNION	all information correct – should be geocodable
300	1	1-3	FRIENDS HOME	Non-geocodable
300	1	3-4	MOTHER IN LAWS	
348	1	7-8	TOWN & COUNTRY	Assign to External City
348	1	11-12	RESIDENTIAL HOME	Non-geocodable
369	1	1-2	PJ FAMILY RESTAURANT	Non-geocodable
378	2	5-6	TOM KOCH	Non-geocodable
425	1	1-2	GAS STATION	Assign to External City
425	1	2-3	HAMILTON OHIO RESIDENCE	Assign to External City
425	1	3-4,7-8	FISH FACTORY	411 W. Kemper Rd, Zip: 45246
425	1	4-5	KROGERS	150 Tri County Pkwy, Cincinnati, OH 45246
425	1	5-6,8	TYLERS TERRACE	Assign to External City
477	1	1-2	KEWADIN CASINO	address should be 1533 D East Hwy 2
477	2	1-2	KEWADIN CASINO	
477	2	6-7	KNIGHTS OF COLUMBUS HALL	Non-geocodable
493	2	1-2	THE LITTLE STORE	6020 Fort Rd, Saginaw, MI 48601
516	5	1-2,6-7	FRIENDS HOME	Non-geocodable
516	4	1-2, 7-8	FRIENDS HOME	
516	1	1-2,9-10	FRIENDS HOME	
542	3	1-4	SISTER LAKE ELEMENTARY SCHOOL	Actual location: 68079 M-152, Benton Harbor, MI 49022

**TABLE 5-2: REVIEW OF CITY/TOWNSHIP ASSIGNMENT BASED ON GEOCODING**

<b>QNO</b>	<b>Person #</b>	<b>Trip #</b>	<b>Location</b>	<b>Assigned City</b>	<b>Assigned Zip</b>	<b>Proposed City</b>
385	2	1	CONTRACTORS CONNECTION	SHELBY TOWNSHIP	48317	UTICA
385	2	2	CONTRACTORS CONNECTION	SHELBY TOWNSHIP	48317	UTICA
385	2	5	CONTRACTORS CONNECTION	SHELBY TOWNSHIP	48317	UTICA
385	2	6	CONTRACTORS CONNECTION	SHELBY TOWNSHIP	48317	UTICA
477	1	4	KEWADIN CASINO	CHRISTMAS	49862	MUNISING
477	1	5	KEWADIN CASINO	CHRISTMAS	49862	MUNISING
477	2	4	KEWADIN CASINO	CHRISTMAS	49862	MUNISING
477	2	5	KEWADIN CASINO	CHRISTMAS	49862	MUNISING
482	1	2	GREAT INDOORS	SHELBY TOWNSHIP	48315	UTICA
482	1	3	GREAT INDOORS	SHELBY TOWNSHIP	48315	UTICA
482	2	2	GREAT INDOORS	SHELBY TOWNSHIP	48315	UTICA
482	2	3	GREAT INDOORS	SHELBY TOWNSHIP	48315	UTICA

**TABLE 5-3: REVIEW OF TAZ ASSIGNMENT**

<b>QNO</b>	<b>Person #</b>	<b>Trip #'s</b>	<b>Assigned TAZ</b>	<b>Possible TAZ</b>
1	1	2-3,5-8	11285	11286
27	1	2-3	12111	12110
43	2	14-15	130193	130191
44	2	2-3, 7-8	130021	130022
44	3	11-12	12024	12025
125	1	1-2	50141	50142
125	1	3-4,8-9	50146	50147
146	2	3-4	10278	10279
173	1	5-6	11251	11250
204	1	3-6	88888888	11578
205	2	5-6	12193	12189
242	1	6-7	10651	10650
250	3	6-7	12020	12021, 12018
250	5	5-6	12020	12021
265	1	2-3	40135	40134
279	1	21-22	150214	150362
285	2	9-10	20542	20528
292	5	1-4	11971	11973
304	2	4-5	12177	12171
306	1	1,3-4,6-10	10014	10012
306	2	1-10	10014	10012
335	2	3-4	10698	10699
335	1	7-8	10698	10699
351	3	4-5	10729	10726
351	2	2-5	10729	10726
380	1	3-4	80143	80142
386	1	2-3, 8-9	20528	20527
390	1	1-2	150216	150364
390	1	5-6	150469	150467
402	1	2-5	110036	110029
410	1	2-3	20341	20756
481	3	1-6	10001	10006
481	1	1-3,5-13	10001	10006
481	2	1-2	10001	10006
483	1	15-16	180759	180757
492	1	1,5-6,9	40109	40108
493	1	3-4	180784	180793
493	1	2-5	180820	180819, 180818, 180817
525	1	1-2	70029	70027
525	2	1-2	70161	70165
525	1	3-8	70161	70165
542	2	6-7	12074	12075
564	1-2	4-5	11588	11587
595	1	1-7,9-10	10673	10674
595	2	1-4	10673	10674

### 5.1.2 Review of Length of Trip

MORPACE submitted files with geocoding information for the trip file which was based off of the MGF version 3 and the Mapmarker software. PB received 1,987 records in the trip file, the following records were disregarded/removed due to the following reasons (in this order):

- 25 records did not make a trip
- 87 records had either the origin or destination not geocoded
- 17 records had the origin and destination geocoded as the same point
- 61 records were removed due to type of trip (bicycle/moped, walk, train, or other)

Of the original 1,987 trips, 190 were removed, leaving 1,797 trips, which is approximately 90%. Two of the trips were made outside Michigan, in the state of Ohio (QNO 36, Person 1, Trip 5 & 6).

There are four (4) checks that are done with respect to travel time and distance.

- The first check determines if a trip is in the same city/township and flags the trip if it is over 90 minutes in the city of Detroit or 60 minutes in other areas.
- The second check compares the time of trip from TransCAD and compares that to the respondent travel time, the trip is flagged if that difference is greater than 60 minutes.
- The third check compares the TransCAD distance to a shortest line distance and a right-angle distance between the two trip ends. If the TransCAD distance is less than the shortest line distance, then the record is flagged. If the TransCAD distance is greater than 125% of the right-angle distance, then the record is flagged.
- The fourth check determines the shortest travel distance from TransCAD and calculates an average speed from the respondent time. If that average speed is less than 5 miles per hour (mph), then the trip is flagged. The trip is flagged if the average speed is over 80 mph for trips over 30 miles, otherwise it is flagged if the speed is over 65 mph.

Same City/Township Check

Trip time within the same city is the first check on the data. This check flags a trip if the travel time is greater than 60 minutes within the same city/township. Trips within the city of Detroit are flagged if the trip is over 90 minutes in time. There are 20 records that were flagged with this check. The table below summarizes those trips which were flagged.

**TABLE 5-4: RECORDS FLAGGED FOR TRAVEL IN SAME CITY/TOWNSHIP**

<b>QNO</b>	<b>Person #</b>	<b>Trip #</b>	<b>Origin / Destination City</b>	<b>Dep. Time</b>	<b>Dep. Day</b>	<b>Arr. Time</b>	<b>Arr. Day</b>	<b>Travel Time (min)</b>
1	1	6	MARQUETTE	1640	1	1800	1	80
23	1	1	ESCANABA	850	1	1142	1	172
153	1	1	FLINT	535	1	945	1	250
153	2	10	FLINT	1701	2	2104	2	243
163	4	8	MIDLAND	950	2	1515	2	325
175	3	2	BEAVERTON	1502	1	1830	1	208
191	1	2	YPSILANTI	1550	1	1705	1	75
274	2	4	RIVES JUNCTION	1130	1	1300	1	90
335	2	6	HOUGHTON	800	2	905	2	65
348	1	1	BESSEMER	1115	1	1300	1	105
380	3	4	VICKSBURG	1540	2	1645	2	65
390	1	2	MUSKEGON	815	1	920	1	65
390	1	3	MUSKEGON	1155	1	1315	1	80
390	1	8	MUSKEGON	1340	2	1850	2	310
390	2	2	MUSKEGON	1155	1	1350	1	115
417	1	5	SANDUSKY	1527	1	930	2	1083
445	1	10	WAKEFIELD	1710	2	1830	2	80
445	1	11	WAKEFIELD	2100	2	2230	2	90
468	1	10	DAVISON	1315	2	1620	2	185
481	1	4	LINCOLN	1345	1	1630	1	165

Record number with QNO 191, person number 1, trip number 2, had a travel time of 75 minutes (highlighted above). This trip started at 3:50 PM and ended at 5:05 PM, which is during the PM peak hour for southeastern Michigan. This trip is approximately 6.6 miles in length, with an average speed of 5.3 miles per hour. It is recommended that this trip be kept in the dataset. All others should be investigated further.

Travel Time Check

Travel time for each trip is calculated within TransCAD using a network provided by the Michigan Department of Transportation. A trip is flagged if the TransCAD travel time is more than 60 minutes different than the respondent travel time. There were 36 records that were found to have a difference of more than 60 minutes, 19 of those records are listed in the above table.

**TABLE 5-5: RECORDS FLAGGED FOR DIFFERENCE IN TRAVEL TIME**

<b>QNO</b>	<b>Person #</b>	<b>Trip #</b>	<b>Origin City</b>	<b>Destination City</b>	<b>Respondent Time (min)</b>	<b>TransCAD Time (min)</b>
1	1	6	MARQUETTE	MARQUETTE	80	13
23	1	1	ESCANABA	ESCANABA	172	1
153	1	1	FLINT	FLINT	250	3
153	2	10	FLINT	FLINT	243	1
163	4	8	MIDLAND	MIDLAND	325	1
175	3	2	BEAVERTON	BEAVERTON	208	20
191	1	2	YPSILANTI	YPSILANTI	75	9
274	2	4	RIVES JUNCTION	RIVES JUNCTION	90	1
335	2	6	HOUGHTON	HOUGHTON	65	2
348	1	1	BESSEMER	BESSEMER	105	1
380	3	4	VICKSBURG	VICKSBURG	65	1
390	1	2	MUSKEGON	MUSKEGON	65	3
390	1	3	MUSKEGON	MUSKEGON	80	8
390	1	8	MUSKEGON	MUSKEGON	310	1
390	2	2	MUSKEGON	MUSKEGON	115	8
417	1	5	SANDUSKY	SANDUSKY	1083	0
445	1	11	WAKEFIELD	WAKEFIELD	90	22
468	1	10	DAVISON	DAVISON	185	1
481	1	4	LINCOLN	LINCOLN	165	1
24	1	1	LACHINE	STANDISH	25	91
98	3	2	ALMA	RIVERDALE	765	15
100	1	2	JENISON	COVERT	150	51
100	1	6	JENISON	COVERT	150	51
110	1	4	MANISTIQUE	CADILLAC	105	235
124	2	3	ALLEGAN	KALAMAZOO	95	22
175	1	1	BEAVERTON	FLINT	835	98
300	2	3	ITHACA	BRECKENRIDGE	105	27
385	1	4	FLINT	GRAND HAVEN	15	139
385	1	5	GRAND HAVEN	FLINT	15	139
385	3	3	FLINT	GRAND HAVEN	10	139
385	3	4	GRAND HAVEN	FLINT	15	139
386	4	5	GRAND LEDGE	LANSING	735	16
390	1	6	SPRING LAKE	MUSKEGON	200	10
492	2	7	FLINT	BURTON	145	11
534	1	3	DETROIT	HAMTRAMCK	180	10
564	2	4	CLARKSTON	WATERFORD	90	5

QNO 385, persons 1 and 3 (highlighted in orange above) have either an origin or destination in Grand Haven, Michigan. This record should be further investigated to determine if the location of the trip is around Flint, Michigan. All other records should be investigated further.

#### Distance

There were no records that had a TransCAD distance below the shortest-line distance between the two end points. There were 308 records that had the TransCAD distance greater than 125% of the right-angle distance between the two end points. There were 236 records that had a TransCAD distance less than 5 miles in length with a RAD distance less than 5 miles in length, these records were considered acceptable (given the size of the MDOT network). The remaining 72 were reviewed and found that the trips had to either go around a lake or was connected to the network such that the shortest path was not within the criteria. Therefore, there were no records found that were flagged that should be investigated further.

#### Average Speed

The next check determines if the average speed is within 5 miles per hour (mph) and 65 mph (80 mph for long trips). If the average speed is above or below that threshold, the records are flagged. There were a total of 248 records flagged for speeds that did not meet these criteria. There were 198 records flagged due to average speed being below 5 mph (80%), with 50 being flagged for speeds above 65 mph on short trips and 80 mph on long trips (20%). Of the 248 records, 122 had a travel distance of less than or equal to 2 miles and a travel time of less than or equal to 30 minutes, these records are considered acceptable. There were 38 records that were found to be acceptable after 10 minutes was either subtracted or added onto the trip time thereby making the speed acceptable. The remaining 88 records were reviewed for further investigation. There were 18 records that were found to be acceptable after it was found that the TransCAD distance was incorrect, these records are highlighted in yellow. The table below summarizes those 84 records that were reviewed further. The records that are highlighted in gray should have their geocoding reviewed further by MORPACE.

There are some trips that involved a trip either made to or from a school, during peak drop-off or pick-up times, these records are recommended to be acceptable trips and are shown in yellow.

TABLE 5-6: QUESTIONABLE RECORDS BASED ON AVERAGE SPEED

QNO	PERNUM	TRIPNUM	Travel Time (min)	TransCAD Time (min)	Transcad Distance (miles)	Speed (mph)	Investigation
23	1	1	172	1.42	0.84	0.3	Travel Time is too long for trip
24	1	1	25	90.58	80.92	194.2	Travel Time is too long for trip
43	3	7	50	5.23	2.67	3.2	This trip was to/from a high school, may have occurred during peak school times
44	1	2	3	4.94	3.38	67.6	Distance too long in TransCAD – acceptable
44	3	2	3	4.94	3.38	67.6	Distance too long in TransCAD – acceptable
98	3	2	765	15.10	11.39	0.9	Trip is too long for the length of trip
100	2	2	30	50.79	53.52	107.0	Trip time too short for length of trip
100	2	6	30	50.79	53.52	107.0	
110	1	1	30	1.71	1.02	2.0	Trip Time too long for length of trip, may want to investigate location of Schoolcraft County Road Commission office
110	1	2	30	1.71	1.02	2.0	
110	1	3	60	1.71	1.02	1.0	
110	1	4	105	235.42	220.65	126.1	Check location of Schoolcraft County Road Commission – trip time too short
153	1	1	250	2.55	1.67	0.4	Travel time is too long for the length of the trip
153	2	10	243	0.63	0.40	0.1	
160	1	3	42	0.50	0.21	0.3	This trip was to a high school most likely during school left-out – trip time is too long
160	2	2	3	6.20	4.59	91.8	TransCAD distance incorrect – record acceptable
163	4	8	325	1.37	0.76	0.1	Trip Time too long for length of trip
175	3	2	208	19.50	13.61	3.9	Trip time too long for length of trip
200	2	4	44	1.32	0.84	1.1	Trip time too long for length of trip
250	1	5	5	15.90	11.47	137.6	TransCAD distance incorrect – records acceptable
250	1	6	5	15.90	11.47	137.6	
250	1	7	5	15.90	11.47	137.6	
250	3	6	5	18.41	12.53	150.4	
250	3	7	10	18.41	12.53	75.2	
250	3	8	25	35.82	27.12	65.1	
250	3	9	15	17.89	17.66	70.6	

**TABLE 5-6: QUESTIONABLE RECORDS BASED ON AVERAGE SPEED (continued)**

<b>QNO</b>	<b>PERNUM</b>	<b>TRIPNUM</b>	<b>Travel Time (min)</b>	<b>TransCAD Time (min)</b>	<b>Transcad Distance (miles)</b>	<b>Speed (mph)</b>	<b>Investigation</b>
250	3	12	20	38.16	28.54	85.6	TransCAD distance incorrect – records acceptable
250	4	7	10	46.68	35.21	211.3	
250	4	8	10	46.53	35.21	211.3	
250	5	5	5	18.34	12.50	150.0	
250	5	8	15	46.53	35.21	140.8	
274	2	2	60	1.03	0.44	0.4	Trip time is too long for the length of trip
274	2	3	30	1.58	0.91	1.8	
274	2	4	90	0.55	0.48	0.3	
274	2	8	30	0.55	0.48	1.0	
274	2	9	30	0.55	0.48	1.0	
274	2	10	60	0.55	0.48	0.5	
335	2	6	65	1.52	0.77	0.7	Trip time too long for length of trip
348	1	1	105	0.93	0.39	0.2	Trip time too long for length of trip
385	1		15	139.38	138.20	552.8	All trips are between Grand Haven or Saginaw and Flint – approximately 40 to 150 miles apart – trip times are too short – These addresses need to be investigated further, they are probably all in Flint
385	1	5	15	139.03	138.07	552.3	
385	2	3	10	38.13	38.04	228.2	
385	3	3	10	139.38	138.20	829.2	
385	3	4	15	139.03	138.07	552.3	
386	4	5	735	16.26	11.43	0.9	Trip time is too long for a trip between Lansing and Grand Ledge, Michigan
390	1	2	65	3.09	1.75	1.6	Trip times are all too long for trips within Muskegon or to nearby Spring Lake
390	1	3	80	7.71	5.39	4.0	
390	1	6	200	9.51	9.01	2.7	
390	1	8	310	0.99	0.71	0.1	
390	2	2	115	7.71	5.39	2.8	
417	1	5	1083	0.30	0.12	0.0	Trip time is too long for this trip
468	1	7	5	6.93	6.12	73.4	KMART has the wrong address – recheck geocoding
468	1	10	185	0.99	0.75	0.2	Trip time is too long for length of trip

**TABLE 5-6: QUESTIONABLE RECORDS BASED ON AVERAGE SPEED (continued)**

<b>QNO</b>	<b>PERNUM</b>	<b>TRIPNUM</b>	<b>Travel Time (min)</b>	<b>TransCAD Time (min)</b>	<b>Transcad Distance (miles)</b>	<b>Speed (mph)</b>	<b>Investigation</b>
481	1	4	165	0.64	0.36	0.1	Trip time too long for length of trip – within same town
491	1	3	40	1.52	0.90	1.4	Trip time is too long for length of trip
492	2	7	145	10.54	6.58	2.7	Trip time too long for length of trip
564	2	4	90	5.49	4.22	2.8	Trip time a little too long for length of trip

## 5.2 Recommendations

The records that are shown in the table below should be reviewed by MORPACE further and determined whether to put those households into a questionable household list.

**TABLE 5-7: QUESTIONABLE RECORDS BASED ON QUALITY CHECKS**

<b>QNO</b>	<b>Person #</b>	<b>Trip #</b>	<b>Origin City</b>	<b>Destination City</b>	<b>Travel Time (min)</b>	<b>Same City</b>	<b>Checks Travel Time</b>	<b>Speed</b>
1	1	6	MARQUETTE	MARQUETTE	80	X	X	
23	1	1	ESCANABA	ESCANABA	172	X	X	X
24	1	1	LACHINE	STANDISH	25		X	X
43	3	7	SAINT JOSEPH	SAINT JOSEPH	50			X
98	3	2	ALMA	RIVERDALE	765		X	X
100	1	2	JENISON	COVERT	150		X	
100	1	6	JENISON	COVERT	150		X	
100	2	2	JENISON	COVERT	30			X
100	2	6	JENISON	COVERT	30			X
110	1	1	MANISTIQUE	MANISTIQUE	30			X
110	1	2	MANISTIQUE	MANISTIQUE	30			X
110	1	3	MANISTIQUE	MANISTIQUE	60			X
110	1	4	MANISTIQUE	CADILLAC	105		X	X
124	2	3	ALLEGAN	KALAMAZOO	95		X	
153	1	1	FLINT	FLINT	250	X	X	X
153	2	10	FLINT	FLINT	243	X	X	X
160	1	3	CHESANING	CHESANING	42			X
163	4	8	MIDLAND	MIDLAND	325	X	X	X
175	1	1	BEAVERTON	FLINT	835		X	
175	3	2	BEAVERTON	BEAVERTON	208	X	X	X
191	1	2	YPSILANTI	YPSILANTI	75	X	X	
200	2	4	BOYNE CITY	BOYNE CITY	44			X
274	2	10	RIVES JUNCTION	RIVES JUNCTION	60			X
274	2	2	RIVES JUNCTION	RIVES JUNCTION	60			X
274	2	3	RIVES JUNCTION	RIVES JUNCTION	30			X
274	2	4	RIVES JUNCTION	RIVES JUNCTION	90	X	X	X
274	2	8	RIVES JUNCTION	RIVES JUNCTION	30			X
274	2	9	RIVES JUNCTION	RIVES JUNCTION	30			X
300	2	3	ITHACA	BRECKENRIDGE	105		X	
335	2	6	HOUGHTON	HOUGHTON	65	X	X	X
348	1	1	BESSEMER	BESSEMER	105	X	X	X
380	3	4	VICKSBURG	VICKSBURG	65	X	X	X
385	1	4	FLINT	GRAND HAVEN	15		X	X
385	1	5	GRAND HAVEN	FLINT	15		X	X
385	2	3	SAGINAW	FLINT	10			X
385	3	3	FLINT	GRAND HAVEN	10		X	X
385	3	4	GRAND HAVEN	FLINT	15		X	X
386	4	5	GRAND LEDGE	LANSING	735		X	X

**TABLE 5-7: QUESTIONABLE RECORDS BASED ON QUALITY CHECKS (continued)**

<b>QNO</b>	<b>Person #</b>	<b>Trip #</b>	<b>Origin City</b>	<b>Destination City</b>	<b>Travel Time (min)</b>	<b>Same City</b>	<b>Checks Travel Time</b>	<b>Speed</b>
390	1	2	MUSKEGON	MUSKEGON	65	X	X	X
390	1	3	MUSKEGON	MUSKEGON	80	X	X	X
390	1	6	SPRING LAKE	MUSKEGON	200		X	X
390	1	8	MUSKEGON	MUSKEGON	310	X	X	X
390	2	2	MUSKEGON	MUSKEGON	115	X	X	X
417	1	5	SANDUSKY	SANDUSKY	1083	X	X	X
445	1	10	WAKEFIELD	WAKEFIELD	80	X		
445	1	11	WAKEFIELD	WAKEFIELD	90	X	X	
468	1	10	DAVISON	DAVISON	185	X	X	X
481	1	4	LINCOLN	LINCOLN	165	X	X	X
491	1	3	ADRIAN	ADRIAN	40			X
492	2	7	FLINT	BURTON	145		X	X
534	1	3	DETROIT	HAMTRAMCK	180		X	
564	2	4	CLARKSTON	WATERFORD	90		X	X

In the above table, there are 52 trips represented by 30 households. MORPACE will need to review some these records for geocoding (highlighted in gray) and make a recommendation for inclusion in the dataset. Some of these records are school trips during peak drop-off/pick-up times and should be considered for inclusion, these records are highlighted in yellow.